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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,290	08/27/2003	Shun-Fa Huang	HUAN3209/EM	4458

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BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314

EXAMINER

MALSAWMA, LALRINFAMKIM HMAR

ART UNIT	PAPER NUMBER
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2825

DATE MAILED: 08/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/648,290	Applicant(s) HUANG ET AL.	
	Examiner Lex Malsawma	Art Unit 2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claims 1, 8 and 10-14 are objected to because of the following informalities:

Regarding claim 1:

At claim 1, lines 14-19, the examiner suggests rephrasing the limitation, “by means of the characteristic provided by the present invention, namely...used for absorbing the infrared rays”, by reciting process steps or sequence of steps; and in lines 24-25, the examiner suggests changing the phrase, “the present invention uses the pulsed...(PRTP)”, to something like, “performing a pulsed rapid thermal annealing process (PRTP)”. In sum, the examiner suggests amending claim 1 to clearly recite a combination of process steps.

Regarding claims 8 and 10-14:

Claim 8 is drawn to a thin-film transistor (TFT) structure; however, all limitations are directed to process steps for forming the TFT structure. Claims 10-14 are further directed to process steps for forming the TFT structure; accordingly, claims 8 and 10-14 are considered to be “product-by-process claims”. Note that a product-by-process claim is directed to the product per se, no matter how actually made and that it is the final product per se which must be determined in a “product-by-process claim”, and not the patentability of the process. Therefore, only structural limitations pertaining the TFT structure in claims 8-14 have been given patentable weight. The examiner suggests amending claims 8-14 to properly recite limitations directed to a TFT structure (i.e., directed to a “final” or novel portions of a TFT structure). Furthermore, claim 8 is similar to claim 1, accordingly, the objections to claim 1 are also relevant to claim 8.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1:

In lines 31-36 (i.e., the last sentence), it is not clear whether the last sentence is a claim limitation or general information relating to the claimed invention, i.e., Is the substrate required to be a glass substrate (compare with line 6, “a substrate”)? Is the heating plate required to be heated at a temperature above 700 °C? Therefore, claim 1 is considered indefinite, since it does not clearly set forth the metes and bounds of the patent protection desired. Furthermore, note the following portions of claim 1:

In line 17, “the infrared rays” lacks antecedent basis;

in line 20, “the heating” and “the energy” lack antecedent basis;

in line 21, “the amorphous layer” lacks antecedent basis;

in line 28, “the materials” lacks antecedent basis;

in line 31, “the glass substrate” lacks antecedent basis; and

Regarding claim 2:

The phrase, “the substrate can be a glass substrate, quartz substrate”, renders this claim indefinite because it seems that claim 1 requires the substrate to be a glass substrate (note claim 1, lines 6 and 31).

Regarding claim 4:

In lines 6-7, “the high thermal diffusion” lacks antecedent basis: and
in line 9, “the metal pollution” lacks antecedent basis.

Regarding claims 3 and 5-7:

These claims are rejected as being dependent upon an indefinite claim (i.e., claim 1).
Any further rejections of, or indications of the allowability of, claims 1-7 are based on the
examiner’s interpretation/understanding of the claims (1-7).

Regarding claims 8-14:

These claims contain limitations similar to (if not exactly the same as) claims 1-7,
therefore, they are indefinite for the same reasons provided above for claims 1-7.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all
obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the
claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various
claims was commonly owned at the time any inventions covered therein were made absent any
evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out
the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-3, 5-10 and 12-14 (all as understood/interpreted) are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. (5,403,772; hereinafter, “**Zhang**”) in view of Yamazaki et al. (5,824,574; hereinafter, “**Yamazaki**”) and Sun et al. (5,265,114; hereinafter, “**Sun**”).

Regarding claims 1 and 2:

Zhang discloses a heating plate crystallization method used in a crystallization process for a polysilicon thin-film transistor, the method comprising:

forming a glass substrate 1A (Col. 12, line 14);

forming an amorphous layer 1 (i.e., a non-crystal layer) on the substrate;

depositing a heating plate layer on the amorphous layer 103;

forming a heating plate area 2 by patterning the heating plate layer (Col. 12, lines 27-32);

and

heating the heating plate area so that the amorphous layer is crystallized to polysilicon (Col. 12, lines 55-58).

Zhang **lacks** specifying whether the heating plate area has an absorption rate to infrared rays, which is better than that of the glass substrate and the amorphous layer; and specifically using infrared rays to take advantage of the different absorption rates of the materials used for the heating plate area, the glass substrate and the amorphous layer. Yamazaki **teaches** a process similar to that disclosed by Zhang, wherein Yamazaki discloses (in Col. 9, lines 17-19) that it is

more effective to incorporate laser irradiation (e.g., using infrared rays, note Col. 10, lines 8-10) with a heating process (as in Zhang). Yamazaki further discloses the laser is scanned across the wafer (note Figs. 3-4), therefore, the laser irradiation process can be considered to be a pulsed rapid thermal process (PRTP). Sun is **cited only to show** that the materials used by Zhang would obviously have different absorption rates and that exploiting the differential absorption rates was well known in the art (note Col. 3, lines 48-62). Given Yamazaki and Sun, it would have been obvious to one of ordinary skill in the art to modify Zhang by incorporating an infrared laser during the heating process and specifically reciting the exploitation of the differences in absorption rates for the materials used by Zhang because Yamazaki teaches that incorporating a laser provides a more effective crystallization process and Sun shows that the materials used by Zhang (and/or Yamazaki) would have differing absorption rates. In other words, given Sun, one of ordinary skill in the art would have realized the Zhang modified as taught by Yamazaki would already include selectively heating the materials with infrared rays and taking advantage of the differing absorption rates.

Regarding claims 3 and 5-7:

Sun shows that the heating plate layer of Zhang (e.g., a nickel, Ni, layer) can absorb the infrared rays (Col. 3, lines 60-62). Zhang discloses the heating plate layer could be made of Cr and materials similar to Mo and W (Col. 21, lines 25-30) and Sun shows tungsten, W, and the material specified by Zhang (e.g., Ni) absorb radiation relatively well (note Sun, Col. 3, lines 60-62). Therefore, the instant claims are held obvious over the cited references because the specified materials are either disclosed by the references or have been shown to have similar

characteristics such that one of ordinary skill in the art would have been able to easily incorporate any of the materials according to design needs.

Regarding claims 8-10 and 12-14:

These claims are directed to a device acquired by the method of claims 1-3 and 5-7; accordingly, these claims are held obvious because all pertinent structural limitations are disclosed, or rendered obvious, by the cited references.

Conclusion


7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The references listed on the attached Form PTO-892 (not specifically cited above) are cited to show methods of crystallizing an amorphous silicon layer using process steps similar to those of the current invention.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lex Malsawma whose telephone number is 571-272-1903. The examiner can normally be reached on Mon-Fri (6AM-2PM EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lex Malsawma 

August 2, 2004


MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800